REMARKS

The Information Disclosure Statement

The Second Information Disclosure Statement, which was filed before the RCE, was not considered by the examiner, primarily on the ground that copies of the references that were identified in the attachment to that Statement were not attached. It was concluded that, "Therefore the references cited in the Search Report have not been considered."

It should at first be noted that the attachment to the Second Information Disclosure Statement was not a search report, as stated in the Office Action, but was, instead, the International Preliminary Examination Report that was issued by the International Searching Authority relative to the corresponding international application. That type of report is now considered to be and is referred to as a patentability report. And significantly, the international claims that were approved in that examination/patentability report are considerably broader than the claims that are currently included in the present application.

Secondly, it should also be noted that each of the references that was identified and considered in that examination report led to the conclusion by the international examiner that the broader claims that are attached to that examination report met each of the novelty, inventive step, and industrial applicability criteria of the PCT. Each of the references that were considered by the international examiner was among the several references that were cited in the original Information Disclosure Statement that was filed herein on October 3, 2004, and that included as attachments the International Search Report and copies of

each of the foreign references that were cited in that search report. No copies of the U.S. references that were listed in that original Information Disclosure Statement were provided because copies of U.S. patents and U.S. patent application publications are not required to be submitted (see MPEP §609.04(a) II. Legible Copies, "The requirement in 37 CFR 1.98(a)(2)(iii) for a legible copy of the specification, including the claims, and drawings of each cited pending U.S. patent application (or portion of the application which caused it to be listed) is *sua sponte* waived where the cited pending application is stored in the USPTO's IFW system.").

Although the examination report itself is not a reference in the usual sense in which that term is used, it is information that is entitled to be considered. As stated at MPEP § 609, page 600-142, "Once the minimum requirements of 37 CFR 1.97 and 37 CFR 1.98 are met, the examiner has an obligation to consider the information. There is no requirement that the information must be prior art references in order to be considered by the examiner."

And as prescribed in MPEP 609.02 B. 3., relative to consideration of a previously-filed Information Disclosure Statement at a time after the filing of an RCE,

> Information filed in the application in compliance with the content requirements of 37 CFR 1.98 before the filing of a RCE will be considered by the examiner after the filing of the RCE. For example, an applicant filed an IDS in compliance with 37 CFR 1.98 after the mailing of a final Office action, but the IDS did not comply with the requirements of 37 CFR 1.97(d)(1) and (d)(2) and therefore, the IDS was not considered by the examiner. *After applicant files a RCE, the examiner will consider the IDS filed prior to the filing of the RCE.* (Emphasis added).

It is therefore respectfully requested that the previously-filed International Preliminary Examination Report be considered, as it shows the reasoning and conclusions of the international examiner relative to the claims to the same invention but of much broader scope that were filed and examined in the international counterpart of the present application. As noted above, each of those claims of the international application was concluded to meet each of the patentability criteria set forth in the PCT.

The Claim Rejections

Claim 1 has been further amended to delete "is a silicate that," and to incorporate the subject matter of claim 4. Consequently, claim 4 has been canceled without prejudice or disclaimer. Claim 1 has also been amended, based upon the disclosure contained in paragraph [0022] of the specification, to recite that metallic impurities that include Mg, Ca, Fe, Na, and K are excluded from the heating element material, in addition to the exclusion of bentonite from the material mixture. Dependent claims 10 and 11 have each been amended as a result of the deletion from claim 1 of "is a silicate that" and are based upon the disclosure contained in paragraph [0021] of the specification. New claim 12 has been added and is based upon paragraph [0021] of the specification.

In the "Claim Rejections – 35 USC § 103" portion of the Office Action beginning on page 3 at paragraph 9, claims 1, 4 through 6, and 8 through 10, were rejected as obvious based upon a combination of the Schrewelius '145 and '959 references, together with the Sekhar et al. '399 and the Chyung et al. '091

references. And on page 11 of the Office Action at paragraph 10, claim 11 was rejected as obvious based upon the same references that were applied against claim 1 along with the Sawamura et al. '215 reference. In that Claim Rejections portion of the Office Action no claims were rejected under 35 USC § 102 as anticipated by any of the individual references.

The present invention is directed to overcoming in a molybdenum silicide-based electrical heating element the problem of peeling or flaking off of an aluminum oxide outer layer during thermal cycling of the heating element. The peeling or flaking off results in aluminum oxide particles that contaminate the interior of a heating oven in which the heating elements are installed. The invention as claimed relates to a method of producing a heating element that includes on its outer surface an oxide layer consisting essentially of aluminum oxide and that does not peel from the surface of the heating element under thermal cycling between room temperature and about 1500°C.

In carrying out the invention, powdered molybdenum aluminosilicate is mixed with SiO_2 that is at least 98% pure, which does not affect the molybdenum silicide crystal lattice symmetry. The mixture is formed into a desired heating element and is then sintered. After sintering the formed heating element contains substantially $Mo(Si_{1-x}Al_x)_2$ and Al_2O_3, wherein x lies in the range of 0.45 – 0.55. The resulting heating element includes on its surface an oxide layer consisting essentially of Al_2O_3 that does not peel from the surface of the formed heating element under thermal cycling of the formed heating element between room temperature and about 1500°C.

In contrast with the claimed invention in which SiO_2 that is at least 98% pure is utilized, prior art heating elements of the molybdenum silicide type were prepared utilizing bentonite clay as a constituent of the heating element material. Bentonite has an SiO_2 content of the order of up to only about 60-70% by weight, and the formed prior art heating elements made with bentonite as the source of SiO_2 had an aluminum oxide surface layer that would peel or flake off when the heating element was thermally cycled between room temperature and heating element operating temperatures, thereby resulting in oven contamination by virtue of the presence of the separated aluminum oxide material.

With regard to the Schrewelius '145 reference, it should at first be noted that that reference is directed primarily to the preparation of a thermo-electric alloy for use as a thermocouple. And although it suggests that the resulting thermocouple "may also be used as an electrical heating resistor," there is no mention in that reference of the formation on an electrical heating resistor of a surface layer of aluminum oxide, there is no mention in that reference of the problem of peeling or flaking off of an aluminum oxide outer layer from any such electrical heating resistor, and there is no mention in that reference of the problem of heating oven contamination resulting from an aluminum oxide outer layer that has peeled or flaked off any such electrical heating resistor. It is also important to note that the Schrewelius '145 reference specifically teaches the use of bentonite as the ceramic binding substance for the composition for each of the legs of the thermocouple that is the subject of that reference (see Schrewelius '145, col. 3, line 3 for the teaching

of bentonite as a component of the positive leg of the thermocouple and line 15 for the teaching of bentonite as a component of the negative leg of the thermocouple).

In addition to the Schrewelius '145 reference failing to disclose molybdenum aluminum silicide mixed in combination with SiO_2 having at least 98% purity, as specifically recited in claim 1, it also teaches the use of bentonite, which claim 1 expressly excludes from the composition produced by the claimed method, as well as from the claimed electrical heating element of claim 6. Thus, by teaching the use of bentonite as a component of the composition of the alloy disclosed in the Schrewelius '145 reference, that alloy is therefore different from the material claimed herein, and it does not lead one to use the claimed high purity SiO_2, thereby teaching away from the invention as it is claimed in amended claim 1.

Moreover, as was pointed out above, Schrewelius '145 relates to a thermocouple element, which is structurally considerably different from a heating element. The thermocouple element disclosed in that reference is not disclosed as having or solving the surface layer peeling problem that is solved by the present invention. Consequently, one of only ordinary skill in the art would not be led to the Schrewelius '145 reference for a solution to such a problem.

Furthermore, it is noteworthy that with respect to the Schrewelius '145 reference it was expressly conceded in the paragraph bridging pages 5 and 6 of the Action that:

> Schrewelius '145 discloses a molybdenum-silicide heating element and method of producing except for the product being formed by the method also consisting essentially of (i.e. comprising) Al_2O_3; and the SiO_2 being at least 98% pure, the SiO_2 present in the heating element material mixture being a silicate, mullite, that does not affect molybdenum silicide crystal lattice symmetry, and the heating element

> material being free of bentonite; and the oxide layer not peeling under thermal cycling at about 1500°C, whereby heating oven contamination in the form of peeled heating element oxide layer particles in a heating oven containing the heating element *is prevented*. (Emphasis in original)

With that explicit concession of the several claim limitations that are not disclosed in the Schrewelius '145 reference, that reference clearly cannot be said to anticipate any of the claims of the present application.

Reference was then made to the Schrewelius '959 reference. That reference is directed to electrical resistance elements formed from materials with "additions effective to prevent grain growth at elevated temperatures" (Schrewelius '959, col. 2, lines 29-30). But with regard to the products disclosed in the Schrewelius '959 reference, the first full paragraph on page 6 of the Action contains several statements concerning that reference that are not supported by the text of that reference. First of all, it was said in the Action that the Schrewelius '959 reference "teaches a method of producing a molybdenum-silicide-type heating element in which a Al_2O_3 product is formed via the chemical reaction to form a ceramic glass component that efficiently stops the grain growth of the silicide at high temperatures (column 5, lines 69-75; column 6, lines1-7)." But the glass component is not Al_2O_3. As stated in the Schrewelius '959 reference at col. 2, lines 44-50, it is a thin film of quartz glass that is formed, and that it protects the element material from further oxidation. And in the sentence bridging cols. 2 and 3 of that reference, it is specifically stated that the ceramic glass compound is a film of silicon dioxide, which is significantly different from the claimed surface oxide layer of Al_2O_3. Also see col. 4, line 38, at which it is again stated that the surface layer is"a surface film of SiO_2."

In the exemplary compositions I and II of the Schrewelius '959 reference, the final product has "a film of silica glass on the exterior surface of the material." (col. 5, lines 45-46). And in the exemplary composition III of the Schrewelius '959 reference, in which aluminum oxide is one of the starting constituents (col. 5, line 16), the presintered material includes "6% by weight ceramic glass, mainly aluminum silicate" (col. 5, lines 66-67). After final sintering, "The glass phase is a reaction product substantially of Al_2O_3 and SiO_2 formed during the oxidation." (col. 6, lines 3-5), and the ceramic glass is "mainly aluminum silicate" (col. 5, lines 66-67), which clearly is the reaction product. Thus, the Schrewelius '959 reference does not disclose or even suggest a heating element having an aluminum oxide surface layer, as recited in amended claim 1. Nor does it relate to reducing peeling or flaking of an oxide surface layer of a heating element under thermal cycling between room temperature and about 1500°C, as recited in amended claim 1. Moreover, it includes in the final rods 0.7% Fe (see col. 5, line 75) which is an element that is excluded from the material recited in amended claim 1, and that therefore serves to further distinguish the disclosure of the Schrewelius '959 reference from the claimed invention.

Regarding the matter of peeling of the oxide layer under thermal cycling, a problem that the claimed invention overcomes, the Schrewelius '959 reference only refers only to a constant, steady-state temperature (col. 7, lines 46-49). There is no disclosure or even a suggestion of and thermal cycling in that reference. Therefore, the different composition silica glass coating taught by that reference was not disclosed as having been subjected to thermal cycling, and thus it cannot be

concluded that that coating would not peel if subjected to that thermal cycling condition.

The Sekhar et al. '399 reference was relied upon for disclosing the use of pure SiO_2 in a heating material mixture. However, the disclosure of the use of pure SiO_2 to raise the working temperature range of a heating element says nothing about thermal cycling between room temperature and about 1500°C, or about peeling of a surface layer. All the temperature tests disclosed in that reference appear to have been run under steady state temperature conditions. The mention in Example 12 of Sekhar et al. of using pure SiO_2 is based upon composition AA, which is identified at col. 7, line 66 to col. 8, line 8, and which does not identify an outer layer of Al_2O_3, and thus it cannot relate to peeling of such an outer layer, nor to thermal cycling of a heating element having such an outer layer, as is claimed in amended claim 1. Further with regard to Sekhar et al., the method taught by that reference involves micropyritic synthesis (see col. 1, lines 47-52) to provide an exothermic reaction of components of the mixtures to thereby expressly avoid the disclosed disadvantageous and costly sintering step (col. 1, lines 31-32). Thus, the Sekhar et al. reference teaches away from the sintering step that is specifically included as a step of the claimed method as it is recited in amended claim 1.

The Chyung et al. '091 reference was cited in connection with its disclosure of mullite, which is not recited in independent claim 1 but only in dependent claim 10. However, the Chyung et al. '091 reference also lacks those features recited in amended claim 1 that are noted in the discussion above relative to the Schrewelius '145 and '959 references, and also the Sekhar et al. '399 reference.

At col. 2, line 63 to col. 3, line 1 of the Chyung et al. reference, it is disclosed that it is necessary that there be "crystallization promoting agents" and that the "glass-ceramic chosen for use in the cermet must be chemically compatible with the alloy chosen for the metallic phase". Those two statements do not at all indicate that it is a "silicate that does not affect molybdenum silicide crystal lattice symmetry," as claimed in amended claim 1. Additionally, the statements of the Chyung et al. reference referred to in the paragraph bridging pages 7 and 8 of the Action, as well as the recitations in claim 9 of that reference are both silent with respect to the crystal lattice recitation contained in amended claim 1 of this application.

Moreover, the Chyung et al. reference also lacks a disclosure of several other features recited in amended claim 1. Specifically, there is not contained in the Chyung et al. reference any mention of a surface layer of Al_2O_3, there is not contained in that reference any mention of surface layer peeling, and there is also not contained in that reference any mention of thermal cycling. Accordingly, the addition of the Chyung et al. reference to the other references that were relied upon still does not teach or even suggest the invention as it is claimed in amended claim 1, or the invention claimed in claim 10, which depends from amended claim 1.

With respect to the relied-upon combination of the references, however, there are no disclosures in any of those references that would motivate one having only ordinary skill in the art, and who is not aware of the present disclosure, to combine them in any way at all, let alone to arrive at the claimed invention. The significant differences between their respective disclosures counsel against any combination of particular elements of any of those references. The examiner has had the benefit of

knowing what is disclosed in the present application, whereas the person of only ordinary skill in the art is presumed not to know what is disclosed in the present application. In that regard, and from the standpoint of the person of only ordinary skill in the art, it is not at all apparent from the references just which parts of which reference should be combined with which parts of the other references and which parts of the references should be ignored or discarded. Indeed, the only motivation apparent for even selecting the references and then combining them in a particular way is the present disclosure.

Without some motivation other than the present disclosure, one of only ordinary skill in the art would be unable to deduce from the several references that are relied upon, each of which is directed to solving a different problem, precisely which elements of which references should be combined with which elements of which of the other references. But it is manifestly improper to use as a road map or as a template an inventor's disclosure in order to justify the selection of discrete parts of discrete references, to thereby use some combination of such references against the inventor in order to attempt to conjure up a mosaic that allegedly renders obvious that which only he has disclosed. The invention as it is claimed in independent claim 1 is not obvious from any combination of the references that were relied upon. As noted above in the discussion of the individual references, there are significant structural and functional differences between the disclosures of the references relied upon, as noted above, and because of those significant differences one of only ordinary skill in the art would have no clue as to how the four references could selectively be combined to arrive at the claimed invention. As it was very recently expressed by the Federal

Circuit:

> [T]he selective hindsight combination of references that show various elements of the claim generally does not suffice to establish obviousness. *See KSR Int'l Co. v Teleflex Inc.*, 550 U.S. 398, 418, 127 S. Ct. 1727, 167 L.Ed. 705 (2007) ("[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, know in the prior art.")
> *In re Mettke*, 570 F.3d 1356, 1360 (Fed. Cir. 2009).

It is respectfully urged that the present obviousness rejection involves a selective hindsight combination of references that allegedly show various elements of the herein-claimed invention, as was the case in *In re Mettke*. And the mere existence of those alleged elements does not establish obviousness of the present invention, as was concluded by the Supreme Court in *KSR*.

Furthermore, claim 1 also includes functional recitations that are not disclosed or suggested in the references. Such functional recitations constitute limitations that must be disclosed by the references in order for the references to be a proper basis upon which to ground a conclusion of obviousness. That functional limitations included in a claim must be considered and cannot be ignored was set forth by the former Board of Patent Appeals as follows:

> Although we have sustained several of the Examiner's rejections we here wish to specifically note that contrary to the Examiner's assertions, functional language in the claims must be given full weight and may not be disregarded in evaluating the patentability of the subject matter defined employing such functional language. However, the applicant must establish that what is taught by the reference does not inherently function in the same manner required by the claim; cf. In re Hallman decided by the CCPA July 16, 1981, 655 F.2d 212, 210 U.S.P.Q. 609.
> *Ex parte Bylund,* 217 U.S.P.Q. 492, 498 (Bd. App. 1981).

And the Federal Circuit has held to the same effect. *K2 Corp. v. Salomon S.A.*, 52 U.S.P.Q.2d 1001, 1004 (Fed. Cir. 1999) ("The functional language is, of course, an additional limitation in the claim.").

Additionally, with regard to functional limitations in a claim, MPEP §2173.05(g) states:

> A functional limitation is an attempt to define something by what it does, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971).
>
> A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. A functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient or step.

Clearly, in view of the authorities cited above, the functional recitations contained in amended claim 1 are acceptable claim limitations. Moreover, those functional limitations, which include preventing surface layer peeling, preventing heating oven contamination by peeled oxide layer particles, and operating the heating elements under thermal cycling conditions, are not disclosed in any of the references, nor do the references inherently function in the same manner as required by the functional recitations contained in amended claim 1. The functional features recited in amended claim 1 are neither disclosed in nor suggested by the references, and therefore amended claim 1 is not obvious based upon the combination of those references.

As noted above, amended claim 1 clearly recites an Al_2O_3 surface layer that

does not peel under thermal cycling between room temperature and about 1500°C. None of the references relied upon discloses or suggests an Al_2O_3 surface layer, nor do any of the references even mention or appreciate the peeling problem to which the present invention is directed. In fact, in teaching against a sintering process by characterizing it as having "serious disadvantages" (col. 1, lines 29-30), the Sekhar et al. reference teaches away from the invention as it is claimed in amended claim 1. Thus, whether the references are considered alone or together, neither the individual references nor any attempted combination of them teaches or suggests the invention as it is claimed in amended claim 1, from which each of the other claims in the application depends, either directly or indirectly.

Another factor that must be considered in an obviousness analysis based upon a combination of references is the likelihood of an expectation by one having only ordinary skill in the art of success in achieving the claimed invention by a combination of the disclosures of the reference disclosures.

> By statute, a claimed invention is unpatentable if the differences between it and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103(a). Subsumed within the *Graham* factors is a subsidiary requirement articulated by this court that where, as here, all claim limitations are found in a number of prior art references, the burden falls on the challenger of the patent to show by clear and convincing evidence that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and *that the skilled artisan would have had a reasonable expectation of success in doing so. DyStar Textilfarben GmbH v. C.H. Patrick Co.,* 464 F.3d 1356, 1360 (Fed.Cir.2006); *Velander v. Garner,* 348 F.3d 1359, 1363 (Fed.Cir.2003).
> *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361, 82 U.S.P.Q.2d 1321 (Fed. Cir. 2007) (Emphasis Added).

And unlike the case with mechanical and electrical inventions, which are conceded to involve predictable results when particular components are combined, in chemical inventions the properties and performance of combinations of different chemical elements or compounds are known to be unpredictable. Thus, one of only ordinary skill in the art would not appreciate from the disclosures of the several references that are relied upon that the material recited in the claims would result in a surface oxide layer that consists essentially of Al_2O_3, and that that layer would not peel from the surface of a heating element formed from that material under thermal cycling of the heating element between room temperature and about 1500°C. The required expectation of success in achieving that result is not warranted from the consideration of any combination of those references. One of only ordinary skill in the art would need to have the present invention in mind to serve as motivation to attempt to pick and choose particular parts of particular references. The claimed material and the claimed result are certainly not obvious from the references relied upon.

The Declaration Under 37 CFR 1.132 of co inventor Mats Sundberg that was filed herein on March 2, 2009, along with a previous AMENDMENT, provides factual evidence in the form of results of testing that was conducted on molybdenum silicide heating elements that were thermally cycled between room temperature and temperatures of from 1400°C to 1565°C. Compositions including different constituents containing SiO_2 were formed, tested, and evaluated from the standpoint of adhesion to the resulting heating elements of their outer layers of Al_2O_3. In the examples described in paragraphs 3 and 7 of that Declaration the

SiO_2 was provided in the form of bentonite, having 60% SiO_2, and in the examples described in paragraphs 4, 5, and 6 the SiO_2 was provided as a powder containing at least 98% SiO_2. In each of the tests in which the tested heating elements were prepared using bentonite as the source of SiO_2 (paragraphs 3 and 7) and thermally cycled, the resulting Al_2O_3 outer layers flaked and exhibited spalling (paragraph 3), or were fragile and porous (paragraph 7). But in the tests involving heating elements prepared using SiO_2 powder containing 98% SiO_2, the resulting heating elements included Al_2O_3 outer layers that in each case adhered to the heating material surfaces after thermal cycling and did not flake off (paragraphs 4, 5, and 6). The results of those tests show that the adhesion to the heating element surfaces of heating elements prepared using 98% pure SiO_2 when subjected to thermal cycling between high temperatures of the order of about 1560°C and room temperature were clearly superior to those prepared using bentonite as the source of SiO_2. Those test results constitute convincing factual evidence of nonobviousness of the claimed invention, not merely argument, and that factual evidence strongly supports the patentability of the present invention as it is claimed herein.

It is also noteworthy that the corresponding European application stemming from the same PCT application as the present U.S. application has been allowed by the European Patent Office and has issued as EP 1 492 739. A copy of that patent was previously submitted and is therefore of record in this application. And the issuance of that patent evidences that the European examiner concluded that the even broader claims as they were approved and published as part of that

patent satisfied each of the novelty, inventive step (nonobviousness), and commercial applicability criteria set forth in the Patent Cooperation Treaty. Furthermore, the undersigned's Swedish associate has indicated that in addition to the European Patent, corresponding applications stemming from that same PCT application have also been granted in Sweden, China, and South Korea.

Finally, in the "Remarks" section of the Action, there was reference to an anticipation rejection – one that was not a rejection that was included under the "Claim Rejections – 35 USC § 103" section of the Action. There was no similar section within the Action that was entitled: "Claim Rejections 35 USC § 102". In that regard, the last sentence of what is numbered as paragraph 13 of the Action states: "Therefore, the rejection of claims 6, 8 and 9 under 35 U.S.C. 102(b) as being anticipated over Schrewelius '145 or, in the alternative, under 35 U.S.C. 103(a) as obvious over Schrewelius '145 is maintained." But because claims 6, 8, and 9 each depend from claim 1, either directly or indirectly, claim 1 would also have to be anticipated in order for claims 6, 8, and 9 to be able to be asserted as anticipated. A dependent claim cannot be anticipated unless the claim(s) from which it depends is(are) also anticipated. But in view of the clear admission in the paragraph bridging pages 5 and 6 of the Action of what is not disclosed in the Schrewelius '145 reference, claim 1 cannot be said to be anticipated by that reference, and therefore claims 6, 8, and 9 are also not anticipated by that reference. And because the "Claim Rejections – 35 USC § 103" section of the Action does not set forth an obviousness rejection of claims 6, 8, and 9 based solely upon the Schrewelius '145 reference, but only upon a combination of four

references that include the Schrewelius '145 reference, no specific discussion of such a rejection is included. In any event, claim 1 is not obvious over the Schrewelius '145 reference considered alone, and therefore dependent claims 6, 8, and 9 are similarly not obvious over that reference considered alone.

Claims 4-6 and 8-10 each depend from amended claim 1, and therefore those claims are not obvious based upon the combination of references that was relied upon, and for the same reasons as are given above in connection with amended claim 1. Moreover, each of those dependent claims contain additional recitations that further distinguish the invention as so claimed from the combination of the references that were relied upon.

Claim 11 was rejected as obvious based upon the combination of the Schrewelius '145 and '959 references, together with the Sekhar et al. '399 and the Chyung et al. '091 references, and in view of the Sawamura et al. '215 reference. The Sawamura et al. '215 reference was cited for disclosing sillimanite. But that reference also lacks the teaching or suggestion of the factors that are missing from the references as discussed above in connection with the other references and that are recited in amended claim 1. Therefore, even if the Sawamura et al. '215 reference were to be combined with the other references that are relied upon by the examiner, that combination still does not teach or suggest the invention as it is claimed in amended claim 1, from which claim 11 indirectly depends.

In addition to the differences in materials, and in addition to the differences in the problems to which the individual references are directed, there are no disclosures in any of the references relied upon that would motivate one having

only ordinary skill in the art to combine them in any way at all, let alone to arrive at the claimed invention. Because the problem addressed by the present invention is not mentioned in the references and is different from the problems to which the references are addressed, one of only ordinary skill in the art would not be led to those references for a solution to the problem of the peeling of an Al_2O_3 outer surface layer of a heating element that is subjected to thermal cycling between room temperature and 1500°C.

New claim 12, which has basis in paragraph [0021] of the specification, recites the functional limitation that other components of a silicate having at least 98% pure SiO_2 have properties that prevent alloying of the other components of the included silicate with molybdenum silicide. None of the references relied upon, whether considered alone or in any combination, discloses or suggests the invention as it is claimed in new claim 12.

Based upon the foregoing amendments and remarks, the claims as they now stand in the application are believed clearly to be in allowable form in that they patentably distinguish over the disclosures contained in the references that were cited and relied upon by the examiner, whether those references be considered alone or together. Consequently, this application is believed now to be in condition for allowance, and reconsideration and reexamination of the application is respectfully requested with a view toward the issuance of a Notice of Allowance.

The courtesy of an interview is respectfully requested if this amendment is not deemed to place the present application in condition for allowance. And in that

event, the examiner is invited to telephone the undersigned to arrange a convenient time for such an interview.

Respectfully submitted,

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Alfred J. Mangels
Reg. No. 22,605
4729 Cornell Road
Cincinnati, Ohio 45241
Tel.: (513) 469-0470